

Glaciers and icecaps: Storehouses of freshwater



Wolverine Glacier, Alaska. Photo by Rod March.

Even though you've probably never seen a glacier, they are a big item when we talk about the world's water supply. Almost 10 percent of the world's land mass is currently covered with glaciers, mostly in places like Greenland and Antarctica. Glaciers are important features in the hydrologic cycle and affect the volume, variability, and water quality of runoff in areas where they occur.

In a way, glaciers are just frozen rivers of ice flowing downhill. Glaciers begin life as snowflakes. When the snowfall in an area far exceeds the melting that occurs during summer, glaciers start to form. The weight of the accumulated snow compresses the fallen snow into ice. These "rivers" of ice are tremendously heavy, and if they are on land that has a downhill slope the whole ice patch starts to slowly grind its way downhill. These glaciers can

vary greatly in size, from a football-field sized patch to a river a hundred miles (161 kilometers) long.

Glaciers affect the landscape

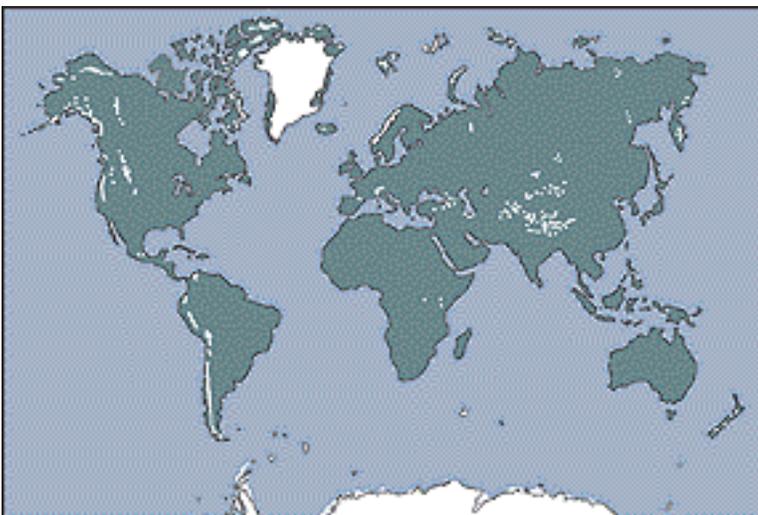
Glaciers have had a profound effect on the topography (lay of the land) in some areas, as in the northern U.S. You can imagine how a billion-ton icecube can rearrange the landscape as it slowly grinds its way overland. In this picture you can see the bowl-shaped valley in a glacial valley in Wyoming where an ancient glacier forced its way through the landscape. Many lakes, such as the Great Lakes, and valleys have been carved out by ancient glaciers. A massive icecap can be found in Greenland, where practically the whole country is covered with ice (shouldn't it be called Whiteland)? The ice on Greenland approaches two miles (3.2 kilometers) in thickness in some places and is so heavy that some of the land has been compressed so much that it is way below sea level.



A glacial (cirque) valley, Popo Agie, Wyoming

Here's a map of where glaciers and icecaps exist in the world.

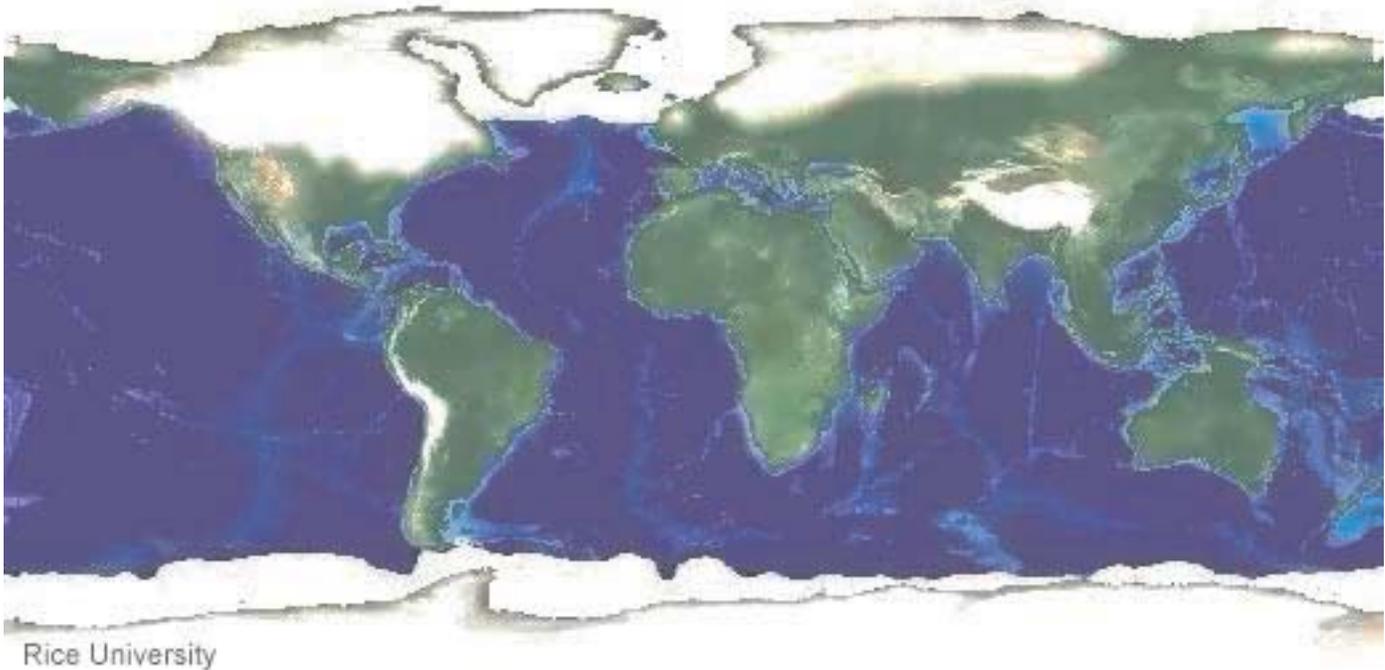
Map of where glaciers and icecaps exist on Earth. White areas show glaciers and ice sheets around the world. The white spots in the oceans are islands where glaciers are found. Reproduced from National Geographic WORLD (February 1977, no. 18, p. 6) with permission.



Ice and glaciers come and go

There are many long-term weather patterns that the Earth goes through. The climate, on a global scale, is always changing, although usually not at a rate fast enough for people to notice. There have been many warm periods, such as when the dinosaurs lived and many cold periods, such as the last ice age of about 20,000 years ago. During the last ice age much of the northern hemisphere was covered in ice and glaciers, and, as this map from the University of Arizona shows, they covered nearly all of Canada, much of northern Asia and Europe, and extended well into the United States.

Glaciers are still around today; tens of thousands of them are in Alaska. Climatic factors still affect them today and during the current warmer climate today, they can retreat in size at a rate easily measured on a yearly scale.



Some glacier and icecap facts

Glaciers store about 75% of the world's freshwater, and if all land ice melted the seas would rise about 70 meters (about 230 feet).

During the last ice age (when glaciers covered more land area than today) the sea level was about 400 feet lower than it is today. At that time, glaciers covered almost one-third of the land.

During the last warm spell, 125,000 years ago, the seas were about 18 feet higher than they are today. About three million years ago the seas could have been up to 165 feet higher.

North America's longest glacier is the Bering Glacier in Alaska, measuring 204 kilometers long.

Glacial ice can be very old—in some Canadian Arctic icecaps, ice at the base is over 100 000 years old.

The land underneath parts of the West Antarctic Ice Sheet may be up to 2.5 kilometers below sea level, due to the weight of the ice.

Antarctic ice shelves may calve icebergs that are over 80 kilometers long.

The Kutiah Glacier in Pakistan holds the record for the fastest glacial surge. In 1953, it raced more than 12 kilometers in 3 months, averaging about 112 meters per day.

Glacial ice often appears blue when it has become very dense. Years of compression gradually make the ice denser over time, forcing out the tiny air pockets between crystals. When glacier ice becomes extremely dense, the ice absorbs all other colors in the spectrum and reflects primarily blue, which is what we see. When glacier ice is white, that usually means that there are many tiny air bubbles still in the ice.